Structured Systems Analysis through Prolog is a book with one such method but it is no worse for that. I recommend it.

S. KAY
Department of Computer Science
University of Manchester
Manchester, UK

Pascal Precisely. 2nd ed. By Judy Bishop. Addison-Wesley, Wokingham, UK, 1989, Price £12.95 (paperback), ISBN 0-201-41633-6.

The programming language Pascal was invented nearly twenty years ago and tutorial textbooks have been available for nearly fifteen years. Despite the more recent advent of other languages serving the same purpose, such as Modula II; despite a greater stress in student teaching on problem analysis and specification; despite the invention of totally new techniques of expressing solutions, such as 4GLs and functional programming... Pascal as a medium for teaching the basic pragmatic skills of programming is still sufficiently popular to encourage publishers and authors.

Judy Bishop's second edition is physically well produced and attractively bound. Desktop publication has been used very effectively to produce camera ready copy. She has used good, but not overdone, variation of font sizes and styles with line divisions and cue graphic symbols highlighting the structured presentation. The syntax diagrams defining the language are an unfortunate exception, with keywords in a different but very similar font to the syntactic references, non-alphabetic symbols in a ludicrously larger font and the syntactic references confusingly in a different font from the corresponding heading on its definition.

The style of presentation of the content is excellent! Clear listed subheadings for each chapter are followed by a stated aim. Numerous miniproblems are used to illustrate language features, including how to choose your socks and how to make up your party invites. Each chapter closes with a summary, quiz and exercises, whose answers are provided in an appendix. However, the explanatory introduction is not up to the generally high standard of content. Here, the viewpoint of computer functionality is not developed properly to show that it is information which is processed. Thus by default, the reader may be left with the impression that it is a calculating engine. Equally, the role of application packages is totally omitted, though these do admittedly have to be programmed initially and tailored by an intellectual act similar to programming. Hardware descriptions are based on an 8086 PC and must rapidly become outdated. The publisher may look to sales of a third edition, but the purchaser may not be so happy.

The philosophy of the book is based on a course to undergraduates. Indeed, an editorial slip in the introduction refers to the book as a course! The aim of the book

is to teach the expression of efficient, readable solutions and it does this well. The realistic solutions and clear explanations give a steady development of knowledge of language features. By the end, all of the language is covered, including conformant arrays, and the order of presentation is well chosen from a tutorial point of view. However, the more fundamental aspects of problem analysis, specification, development of solution and reasoning on validity/efficiency/testing are dealt with informally or not at all. Little help is given in extending the stepwise refinement into a professional software engineering approach.

As a conversion guide to the non-Pascal-speaking programmer, the book is too long (340 pages) with the language details inextricably bound into the explanatory text. Precise details of language rules are hard to find, for example the reviewer could not find what the rules are concerning FOR loop variables. As an aid to academic study of reasoned consideration of the computing process, the book is too pragmatic, with an outdated approach to the whole programming process. However, as a developmental manual for learning to program in Pascal, the book is to be highly recommended even at its somewhat high price. Given the obvious choice of market and ineffectiveness as a reference, the title is clearly badly chosen!

Ian R. WILSON
Department of Computer Science
University of Manchester
Manchester, UK

Foundations of Programming Languages. By J. Loecks, K. Mehlhorn and R. Wilhelm. Wiley, Chichester, UK, 1988, Price £24.50 (paperback), ISBN 0-471-92139-4.

The title of this book does not give a full idea of its contents. It is the text for a first-year course at the Universität des Saarlandes, and its aim is to introduce students to programming as a formal process amenable to rigorous treatment. This approach to first-year courses is gradually replacing "teach them to program in Pascal" in many universities, but this text takes a significantly different route towards this goal.

The introduction develops total correctness and time complexity arguments for informal programs meeting formal specifications of some array processing tasks. The rest of the book is devoted to giving a formal operational semantics and compiler for the programming language PROSA, a local Pascal derivative. The first chapter develops the formalisms necessary to understand the semantic definition: the theory of relations and functions, formal languages and context-free grammars, the interpretation of recursive definitions, attribute grammars and "mathematical machines" (automata). This is done at a high level of mathematical sophistication, which is maintained in the rest of the book. Some grasp of set theory and of the construction of rigorous arguments is a prerequisite, and by the second page transitive closure is being defined as an intersection of a set of reflexive and transitive relations, a